In the Claims:

1. (Currently amended) An apparatus for thermal sterilization of a microbiologically contaminated liquid to produce a thermally treated liquid, said apparatus comprising:

a pressure vessel enclosing a pressure space therein and having a vessel inlet and a vessel outlet;

a heater arranged in a heating zone in said pressure space within said pressure vessel; and

a heat exchanger arranged in said pressure vessel, having a heat exchanger inlet, a heat exchanger outlet and a heat exchange wall defining first and second flow paths along opposite sides of said heat exchange wall;

wherein at least one of said heat exchanger inlet and outlet is connected to at least one of said vessel inlet and outlet respectively, so that the contaminated liquid can flow into said pressure vessel through said vessel inlet, along said first flow path in a first net flow direction, and through said heating zone to [[~~from~~]] form the treated liquid, and the treated liquid can flow from said heating zone along said second flow path in a second net flow direction and out of said pressure vessel through said vessel outlet, while heat is transferred from the treated liquid to the contaminated liquid through said heat exchange wall.

2. (Original) The apparatus according to claim 1, wherein said heat exchanger is a counterflow heat exchanger, and the second net flow direction is opposite the first net flow direction.

3. (Original) The apparatus according to claim 2, wherein said heat exchanger is configured, dimensioned, arranged and adapted so that a substantial proportion of energy needed for heating the contaminated liquid is retained inside said pressure vessel by re-cooling of the treated liquid along said second flow path of said heat exchanger before the treated liquid exits said pressure vessel.

4. (Original) The apparatus according to claim 1, wherein only one of said heat exchanger inlet and outlet is connected to only one of said vessel inlet and outlet respectively at a distal end of said heat exchanger relative to said heating zone, and another of said heat exchanger inlet and outlet is open within said pressure space in said pressure vessel at a proximal end of said heat exchanger relative to said heating zone.

5. (Original) The apparatus according to claim 1, wherein said heat exchanger outlet is connected to said vessel outlet at a distal end of said heat exchanger relative to said heating zone, and said heat exchanger inlet is open within said pressure space in said pressure vessel at a proximal end of said heat exchanger relative to said heating zone.

6. (Original) The apparatus according to claim 1, wherein said second flow path is bounded and enclosed by said heat exchange wall and thereby confined inside said heat exchanger, and said first flow path is a portion of said pressure space surrounding said heat exchanger within said pressure vessel.

7. (Original) The apparatus according to claim 1, wherein said heat exchanger has a hollow pipe-shape, and said heat exchange wall is a cylindrical pipe wall enclosing said second flow path therein.

8. (Original) The apparatus according to claim 1, wherein said heater is an electric resistance heater, and further comprising a temperature sensor arranged in said heating zone within said pressure vessel, and a power regulator connected to said temperature sensor to receive a temperature signal therefrom and connected to said electric resistance heater to apply thereto electrical power regulated dependent on the temperature signal.

9. (Original) The apparatus according to claim 1, further comprising a pressurizing pump outside of said pressure vessel connected to said vessel inlet.

10. (Original) The apparatus according to claim 9, further comprising a pressure-reducing device outside of said pressure vessel connected to said vessel outlet.

11. (Original) The apparatus according to claim 10, wherein said pressure-reducing device is connected for energy transmission to said pressurizing pump.

12. (Original) The apparatus according to claim 11, comprising a common shaft or a mechanical transmission by which said pressure-reducing device is connected to said pressurizing pump.

13. (Original) The apparatus according to claim 11, wherein said pressurizing pump and said pressure-reducing device together form a pressurizing-depressurizing module.

14. (Original) The apparatus according to claim 11, further comprising a drive motor connected to said pressurizing pump.

15. (Original) The apparatus according to claim 9, further comprising an excess pressure relief device connected to said vessel inlet parallel to said pressurizing pump.

16. (Original) The apparatus according to claim 1, further comprising a pressure-reducing turbine outside of said pressure vessel connected to said vessel outlet.

17. (Original) An apparatus for thermal sterilization of a microbiologically contaminated liquid, said apparatus comprising:

a pressure vessel enclosing a pressure space therein and having a vessel inlet and a vessel outlet;

a heater arranged in a heating zone in said pressure space within said pressure vessel;

a counterflow heat exchanger arranged in said pressure vessel, having a proximal end and a distal end relative to said heating zone, said proximal end being open to said pressure space within said pressure vessel, and said distal end being connected for flow communication with said vessel inlet or said vessel outlet; and

a pressurizing pump outside of said pressure vessel connected to said vessel inlet.

18. (Original) The apparatus according to claim 17, further comprising a pressure-reducing device outside of said pressure vessel connected for flow communication with said vessel outlet, and connected mechanically for power transmission to said pressurizing pump.

19. (Currently amended) A method <u>of using the apparatus according to claim 1,</u> for thermally sterilizing [[a]] <u>the</u> microbiologically contaminated liquid to produce [[a]] <u>the</u> thermally treated liquid, comprising the steps:

a) pressurizing said contaminated liquid;

b) flowing said contaminated liquid in [[a]] said first net flow direction along [[a]] said first [[side]] flow path of [[a]] said heat exchanger thereby pre-heating said contaminated liquid with heat transferred [[from]] through said heat exchange wall of said heat exchanger;

c) flowing said contaminated liquid through [[a]] said heating zone, and in said heating zone, heating said contaminated liquid with [[a]] said heater to a sufficiently high treatment temperature for achieving the thermal sterilization of said contaminated liquid to produce said thermally treated liquid;

d) flowing said thermally treated liquid in [[a]] said second net flow direction opposite said first net flow direction along [[a]] said second [[side]] flow path of said heat exchanger physically separated from and in thermal communication with said contaminated liquid [[on]] in said first [[side]] flow path of said heat exchanger, thereby cooling said thermally treated liquid by transferring heat from said thermally treated liquid to said heat exchanger; and

e) reducing a pressure of said thermally treated liquid.

20. (Original) The method according to claim 19, wherein said step e) further comprises recovering energy from said reducing of said pressure, and then further comprising using said energy in performing said step a).

21. (Original) The method according to claim 19, wherein said treatment temperature in said step c) is above a normal atmospheric boiling point of said contaminated liquid, and said contaminated liquid is maintained in a liquid state because said contaminated liquid is pressurized to above atmospheric pressure in said step a).

22. (Original) The method according to claim 19, wherein said contaminated liquid is pressurized to a pressure of at least 16 bar in said step a) and said pressure is maintained in said steps b), c) and d), and wherein said treatment temperature in said step c) is at least 200°C.

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